

REMARKS

Claims 10-12 have been rewritten to more definitely set forth the invention and obviate the rejections. Support for the amendment of Claims 10-12 can be found in Figures 8 and 10, and in the Specification on page 8, line 22, to page 9, line 8; page 10, line 8-9; page 10, line 23, to page 11, line 4; page 11, line 18, to page 12, line 17; page 14, line 2; page 26, line 6-19; and page 27, line 21, to page 29, line 10. The present amendment is deemed not to introduce new matter. Claims 10-12 and 14-19 remain in the application, claims 14-19 having been previously withdrawn from prosecution.

Reconsideration is respectfully requested of the rejection of Claim 10 under 35 U.S.C. 102(b) as being anticipated by von Buren, et al. (USP 5,040,969).

The cited von Buren, et al. reference, as shown in Figures 1-4 therein, discloses a tandemly arranged injection molding machine 11 capable of sequentially injecting molten resin into a plurality of molds 12 and 13. Each mold A and B “has an inlet means 14 and 16”, respectively (see column 2, line 37), i.e., each mold cavity has one resin port. Thus, each mold (or cavity, as referred to in the present invention) is filled with resin through one inlet means (i.e., resin supplying port).

The inlet means 14 and 16 are injected with resin by “an extruder 21 having an attached nozzle means 22 and a nozzle valve 23. The extruder, nozzle means, and valves are moveable as an assembly, to and from mold station to mold station under control of a first power means P” (see column 2, lines 46-50, and Figures 2 and 3). Thus, as illustrated in Figures 1 and 2, and as described above, the apparatus of von Buren, et al. is used to travel along a line of molds (i.e.,

cavities), and inject resin into each *by filling each entire cavity via the one inlet means* (i.e., resin port) supplied in each cavity.

In contrast, the present invention provides, as now claimed herein in amended claim 10, a **low injection pressure molding method** comprising moving an injection portion along a line of a plurality of **vertically disposed** resin supplying ports in communication with a cavity, while injecting molten resin from the injection portion into the **vertically disposed** resin supplying ports, so as to **fill the cavity with molten resin via a plurality of injections**, wherein the molten resin is sequentially injected into the **vertically disposed** resin supplying ports *at a low injection pressure* by moving the injection portion from one **vertically disposed** resin supplying port to the next **vertically disposed** resin supplying port, thereby injecting molten resin to all the **vertically disposed** resin supplying ports in a sequential manner. By following this method, molten resin may be injected sequentially into all of the resin supplying ports at a low pressure, so as to fill one entire cavity with molten resin using several injection steps.

The von Buren, et al. reference fails to teach or suggest a low injection pressure molding method, as now claimed herein, wherein one cavity, *having multiple vertically disposed resin supplying ports disposed therein*, is filled with molten resin by injecting each resin supplying port in a sequentially manner. In particular, von Buren, et al. fails to disclose moving the injection portion vertically, from one resin supplying port to another, to fill a cavity with molten resin. Rather, that teaching or suggestion comes only from the present invention, and constitutes an important element or aspect thereof.

In view of the amendments to claim 10 herein, as well as the deficiencies of the cited von Buren, et al. reference pointed out above, it is believed that the von Buren, et al. reference fails to anticipate the low injection pressure molding method claimed herein. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over von Buren, et al. in view of Makinson, et al. (USP 4,124,343).

The von Buren, et al. reference is discussed in detail above. As the Examiner has recognized in the instant Office Action, von Buren, et al. fail to teach the vertical movement of the injection portion, a key element in the instantly claimed method. To cure this deficiency, the Examiner has cited the Makinson, et al. reference.

Makinson, et al. discloses an injection molding apparatus, as illustrated in Figure 1, mounted on a carriage 20, which can be moved along carriage rails 17, to align the injection molding apparatus with the mold sprues 33 (i.e., injection ports) of individual molds M and mold press units P. "The mold press units P are arranged in a linear array which can include from two to eight or more individual separate free standing mold press units" (see column 2, lines 18-21). An elevator 85 is provided, as illustrated in Figure. "To align the nozzle and sprue at the same elevation, the elevator platform is raised, the locking frame surfaces sliding upward along the guide surfaces of the adaptors" (see column 6, lines 5-8).

In particular, as in von Buren, et al., Makinson, et al. disclose a technique which includes moving one injector mainly horizontally and sequentially along a line of a plurality of separate

molds, and filling each mold by injecting mold *once*. Thus, like von Buren, et al., Makinson, et al. fail to disclose moving an injection portion sequentially along a line of vertically disposed resin supplying ports, all of said resin supplying ports being in communication with *ONE cavity*, and injecting molten resin into the resin supplying ports sequentially from the lowest elevation resin supplying port to the highest elevation resin supplying port, as now claimed herein.

Although Makinson, et al. discloses an elevator 85 to raise the nozzle, the elevator 85 merely aligns the nozzle and sprue for each separate mold, each mold having only one sprue (i.e., one resin supplying port). Specifically, as illustrated in Figure 1, the injector moves horizontally (and slightly vertically if needed, via the elevator 85) so as to be positioned opposite a target mold, such that the position of the nozzle agrees with that of the target mold, even when each target mold is positioned at a different height (see column 3, lines 62-68, and column 4, lines 1-3). Accordingly, the elevator 85 merely serves to align the nozzle with a **single sprue on each mold**, but does not move the nozzle to a plurality of vertically disposed resin supplying ports disposed on one mold, as claimed herein.

Rather, this teaching comes only from the present invention, and enables superior low injection pressure molding of a cavity by sequential injection of molten resin into same several times via several different resin supplying ports, from the bottom port to the top port. Thus, a single cavity is completely filled with resin, without using high pressure injection, and the advantage of improved adhesion to each molten resin portion in a vertical direction is obtained. Further, by avoiding the need for high pressure injection, the molds can be much lighter and less expensive.

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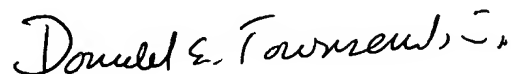
Moreover, the presently claimed method requires only one injection head, enables the use of fairly lightweight molds, and which, consequently, enables the use of inexpensive injection molding equipment. Further, by using several gates for sequential resin injection, the present method allows the use of very large and/or long mold cavities. And, as the mold cavity is inclined in a vertical manner, gravitational forces push the molten resin down into the mold cavity, completely filling the mold cavity to provide a desirable finished product.

In view of the amendments to claims 10-12 herein, as well as the deficiencies of the cited references as described above, it is believed that the Examiner would now be justified in no longer maintaining the rejection. Withdrawal of the rejection is accordingly respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is now in condition for allowance, and early action and allowance thereof is accordingly respectfully requested. In the event there is any reason why the application cannot be allowed at the present time, it is respectfully requested that the Examiner contact the undersigned at the number listed below to resolve any problems.

Respectfully submitted,

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I hereby certify that this 11-page Amendment After Final in patent application Serial No. 10/632,844, is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

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P.O. Box 1450
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on December 1, 2006.

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